3-Level NPC Inverter Module

Product Preview

NXH600N105H7F5S2HG, NXH600N105H7F5P2HG

The NXH600N105H7F5S2HG/P2HG is a power module in F5BP package containing an I-type neutral point clamped three-level inverter. The integrated field stop trench IGBTs and FRDs provide lower conduction and switching losses, enabling designers to achieve high efficiency, high power density and superior reliability.

Features

- I-type Neutral Point Clamped Three-level Inverter Module
- 1050 V Field Stop 7 IGBTs
- Low Inductive Layout
- Solder Pins and Press Fit Pins
- Integrated NTC Thermistor
- These Devices are Pb-Free, Halide Free and are RoHS Compliant

Typical Applications

- Energy Storage System
- Solar Inverter
- Uninterruptable Power Supplies Systems

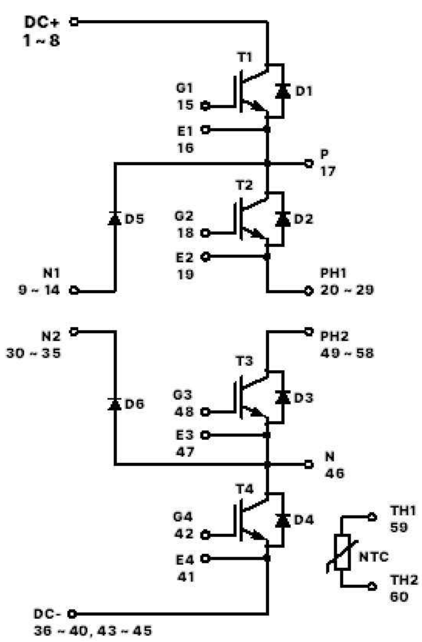
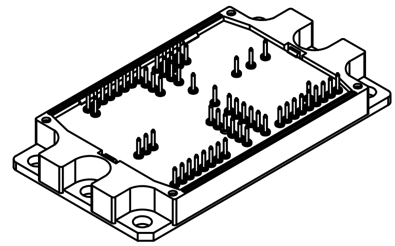
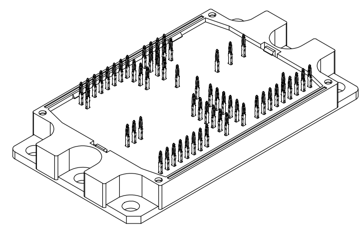


Figure 1. NXH600N105H7F5S2HG/P2HG Schematic Diagram

This document contains information on a product under development. **onsemi** reserves the right to change or discontinue this product without notice.

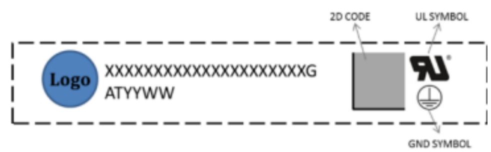


PIM60 112.00x62.00x12.00
CASE 180CW



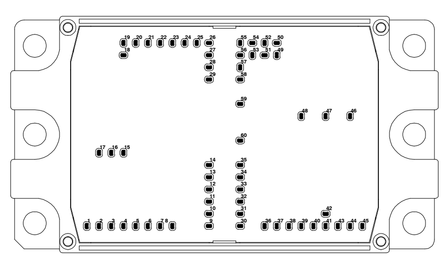
PIM60 112.00x62.00x12.00
CASE 180HY

MARKING DIAGRAM



XXXXX = Device Code
G = Pb-Free Package
AT = Assembly & Test Site Code
YYWW = Year and Work Week Code

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

MODULE CHARACTERISTICS

Operating Temperature under Switching Condition	T_{VJOP}	−40 to 150	°C
Storage Temperature Range	T_{stg}	−40 to 125	°C
Isolation Test Voltage, t = 2 s, 50 Hz (Note 1)	V_{is}	4800	V_{RMS}
Stray Inductance	$L_{s\ CE}$	15	nH
Terminal Connection Torque (M5, Screw)	M	3 to 5	Nm
Weight	G	245	g
Creepage Distance (Terminal to Heatsink)		17.46	mm
Creepage Distance (Terminal to Terminal)		6.48	mm
Clearance Distance (Terminal to Heatsink)		15.62	mm
Clearance Distance (Terminal to Terminal)		5.05	mm
Comparative Tracking Index	CTI	>600	

1. 4800 VAC_{RMS} for 2 second duration is equivalent to 4000 VAC_{RMS} for 1 minute duration.

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
OUTER IGBT (T1, T4)			
Collector-Emitter Voltage	V_{CES}	1050	V
Gate-Emitter Voltage Positive Transient Gate-Emitter Voltage (T_{pulse} = 5 ms, D < 0.10)	V_{GE}	±20 30	V
Continuous Collector Current @ T_c = 80°C (T_J = 175°C)	I_C	429	A
Pulsed Peak Collector Current @ Tc = 80°C (T_J = 175°C), T_{pulse} = 1 ms	I_{Cpulse}	1287	A
Power Dissipation (T_J = 175°C, Tc = 80°C)	P_{tot}	1080	W
Minimum Operating Junction Temperature	T_{JMIN}	−40	°C
Maximum Operating Junction Temperature	T_{JMAX}	175	°C
INNER IGBT (T2, T3)			
Collector-Emitter Voltage	V_{CES}	1050	V
Gate-Emitter Voltage Positive Transient Gate-Emitter Voltage (T_{pulse} = 5 ms, D < 0.10)	V_{GE}	+20 30	V
Continuous Collector Current @ T_c = 80°C (T_J = 175°C)	I_C	433	A
Pulsed Peak Collector Current @ Tc = 80°C (T_J = 175°C), T_{pulse} = 1 ms	I_{Cpulse}	1299	A
Power Dissipation (T_J = 175°C, Tc = 80°C)	P_{tot}	1080	W
Minimum Operating Junction Temperature	T_{JMIN}	−40	°C
Maximum Operating Junction Temperature	T_{JMAX}	175	°C
SiC NEUTRAL POINT DIODE (D5, D6)			
Peak Repetitive Reverse Voltage	V_{RRM}	1050	V
Continuous Forward Current @ Tc = 80°C (T_J = 175°C)	I_F	192	A
Repetitive Peak Forward Current (T_J = 175°C), T_{pulse} = 1 ms	I_{FRM}	576	A
Maximum Power Dissipation @ Tc = 80°C (T_J = 175°C)	P_{tot}	419	W
Minimum Operating Junction Temperature	T_{JMIN}	−40	°C
Maximum Operating Junction Temperature	T_{JMAX}	175	°C
INVERSE DIODES (D1, D2, D3, D4)			
Peak Repetitive Reverse Voltage	V_{RRM}	1050	V
Continuous Forward Current @ Tc = 80°C (T_J = 175°C)	I_F	196	A
Repetitive Peak Forward Current (T_J = 175°C), T_{pulse} = 1 ms	I_{FRM}	588	A

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Symbol	Value	Unit
INVERSE DIODES (D1, D2, D3, D4)			
Maximum Power Dissipation @ Tc = 80°C (T_J = 175°C)	P_{tot}	434	W
Minimum Operating Junction Temperature	T_{JMIN}	–40	°C
Maximum Operating Junction Temperature	T_{JMAX}	175	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

2. Refer to ELECTRICAL CHARACTERISTICS, RECOMMENDED OPERATING RANGES and/or APPLICATION INFORMATION for Safe Operating parameters

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
OUTER IGBT (T1, T4)						
Collector-Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 1050 V	I_{CES}	–	–	500	μA
Collector-Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 600 A, T_J = 25°C	$V_{CE(sat)}$	–	1.6	2.3	V
	V_{GE} = 15 V, I_C = 600 A, T_J = 150°C		–	2.0	–	
Gate-Emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 600 mA	$V_{GE(TH)}$	4.0	5.5	6.9	V
Gate Leakage Current	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	–	1	μA
Internal Gate Resistor		R_g	–	0.58	–	Ω
Turn-off safe operating area	V_{CC} < 800 V, $R_{G\ (off)}$ ≥ 30 Ω, T_{vj} < 150°C		–	800	–	A
Turn-on Delay Time	T_J = 25°C V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, $R_{G\ (on)}$ = 9 Ω, $R_{G\ (off)}$ = 18 Ω	$t_{d(on)}$	–	260	–	ns
Rise Time		t_r	–	60	–	
Turn-off Delay Time		$t_{d(off)}$	–	1264	–	
Fall Time		t_f	–	15	–	
Turn-on Switching Loss per Pulse		E_{on}	–	6570	–	μJ
Turn-off Switching Loss per Pulse		E_{off}	–	9400	–	
Turn-on Delay Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, $R_{G\ (on)}$ = 9 Ω, $R_{G\ (off)}$ = 18 Ω	$t_{d(on)}$	–	230	–	ns
Rise Time		t_r	–	63	–	
Turn-off Delay Time		$t_{d(off)}$	–	1369	–	
Fall Time		t_f	–	9.8	–	
Turn-on Switching Loss per Pulse		E_{on}	–	7130	–	μJ
Turn-off Switching Loss per Pulse		E_{off}	–	11860	–	
Input Capacitance	V_{CE} = 20 V, V_{GE} = 0 V, f = 100 kHz	C_{ies}	–	48843	–	pF
Output Capacitance		C_{oes}	–	1767	–	
Reverse Transfer Capacitance		C_{res}	–	281	–	
Total Gate Charge	V_{CE} = 600 V, I_C = 57 A, V_{GE} = –15/+20 V	Q_g	–	2988	–	nC
Thermal Resistance – Chip-to-heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.139	–	°C/W
Thermal Resistance – Chip-to-case		R_{thJC}	–	0.088	–	°C/W
SiC NEUTRAL POINT DIODE (D5, D6)						
Diode Forward Voltage	I_F = 200 A, T_J = 25°C	V_F	–	1.6	1.75	V
	I_F = 200 A, T_J = 150°C		–	2.1	–	
Reverse Recovery Time	T_J = 25°C V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, $R_{G\ (on)}$ = 9 Ω	t_{rr}	–	20	–	ns
Reverse Recovery Charge		Q_{rr}	–	400	–	nC
Peak Reverse Recovery Current		I_{RRM}	–	24	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.5	–	A/ns
Reverse Recovery Energy		E_{rr}	–	117	–	μJ

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
SiC NEUTRAL POINT DIODE (D5, D6)						
Reverse Recovery Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, $R_{G\ (off)}$ = 9 Ω	t_{rr}	–	23	–	ns
Reverse Recovery Charge		Q_{rr}	–	500	–	nC
Peak Reverse Recovery Current		I_{RRM}	–	29	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.4	–	A/ns
Reverse Recovery Energy		E_{rr}	–	150	–	μJ
Thermal Resistance − Chip-to-heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.331	–	°C/W
Thermal Resistance − Chip-to-case		R_{thJC}	–	0.227	–	°C/W
INNER IGBT (T2, T3)						
Collector-Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 1050 V	I_{CES}	–	−2	500	μA
Collector-Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 600 A, T_J = 25°C	$V_{CE(sat)}$	–	1.6	2.3	V
	V_{GE} = 15 V, I_C = 600 A, T_J = 150°C		–	2.0	–	
Gate-Emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 600 mA	$V_{GE(TH)}$	4.0	5.5	6.9	V
Gate Leakage Current	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	−0.02	1	μA
Internal Gate Resistor		R_g	–	0.58	–	Ω
Turn-off Safe Operating Area	V_{CC} < 800V, $R_{G\ (off)}$ ≥ 35 Ω, T_{vj} < 150°C		–	800	–	A
Turn-on Delay Time	T_J = 25°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, $R_{G\ (on)}$ = 7 Ω, $R_{G\ (off)}$ = 31 Ω	$t_{d(on)}$	–	233	–	ns
Rise Time		t_r	–	57	–	
Turn-off Delay Time		$t_{d(off)}$	–	2200	–	
Fall Time		t_f	–	18	–	
Turn-on Switching Loss per Pulse		E_{on}	–	8640	–	μJ
Turn-off Switching Loss per Pulse		E_{off}	–	11800	–	
Turn-on Delay Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, $R_{G\ (on)}$ = 7 Ω, $R_{G\ (off)}$ = 31 Ω	$t_{d(on)}$	–	210	–	ns
Rise Time		t_r	–	62	–	
Turn-off Delay Time		$t_{d(off)}$	–	2350	–	
Fall Time		t_f	–	18	–	
Turn-on Switching Loss per Pulse		E_{on}	–	12510	–	μJ
Turn-off Switching Loss per Pulse		E_{off}	–	14500	–	
Input Capacitance	V_{CE} = 20 V, V_{GE} = 0 V, f = 100 kHz	C_{ies}	–	47927	–	pF
Output Capacitance		C_{oes}	–	1871	–	
Reverse Transfer Capacitance		C_{res}	–	304	–	
Total Gate Charge	V_{CE} = 600 V, I_C = 57 A, V_{GE} = −15/+20 V	Q_g	–	2940	–	nC
Thermal Resistance − Chip-to-heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.139	–	°C/W
Thermal Resistance − Chip-to-case		R_{thJC}	–	0.088	–	°C/W
INVERSE DIODES (D1, D2, D3, D4)						
Diode Forward Voltage	I_F = 300 A, T_J = 25°C	V_F	–	2.5	3.4	V
	I_F = 300 A, T_J = 150°C		–	2.3	–	
Reverse Recovery Time	T_J = 25°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, $R_{G\ (on)}$ = 7 Ω	t_{rr}	–	100	–	ns
Reverse Recovery Charge		Q_{rr}	–	5580	–	nC
Peak Reverse Recovery Current		I_{RRM}	–	135	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.8	–	A/ns
Reverse Recovery Energy		E_{rr}	–	1664	–	μJ

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
INVERSE DIODES (D1, D2, D3, D4)						
Reverse Recovery Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, $R_{G\ (on)}$ = 7 Ω	t_{rr}	–	187	–	ns
Reverse Recovery Charge		Q_{rr}	–	16903	–	nC
Peak Reverse Recovery Current		I_{RRM}	–	201	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.6	–	A/ns
Reverse Recovery Energy		E_{rr}	–	6485	–	μJ
Thermal Resistance − Chip-to-heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.277	–	°C/W
Thermal Resistance − Chip-to-case		R_{thJC}	–	0.220	–	°C/W
THERMISTOR CHARACTERISTICS						
Nominal Resistance	T = 25°C	R_{25}	–	5	–	kΩ
Nominal Resistance	T = 100°C	R_{100}	–	492.2	–	Ω
Deviation of R25		R/R	−1	–	1	%
Power Dissipation		P_D	–	5	–	mW
Power Dissipation Constant			–	1.3	–	mW/K
B-value	B(25/85), tolerance ±1%		–	3430	–	K

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

ORDERING INFORMATION

Orderable Part Number	Marking	Package	Shipping
NXH600N105H7F5S2HG	NXH600N105H7F5S2HG	F5 – PIM60 112x62 (SOLDER PIN) (Pb-Free / Halide Free)	8 Units / Blister Tray
NXH600N105H7F5P2HG	NXH600N105H7F5P2HG	F5 – PIM60 112x62 (PRESS FIT PIN) (Pb-Free / Halide Free)	8 Units / Blister Tray

TYPICAL CHARACTERISTICS – IGBT T1/T4 AND D5/D6 DIODE

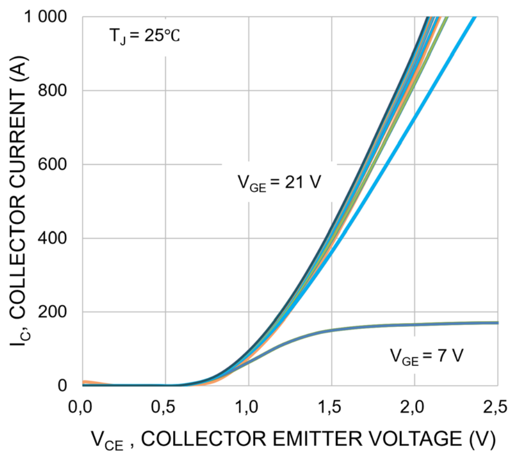


Figure 2. Typical Output Characteristics – IGBT

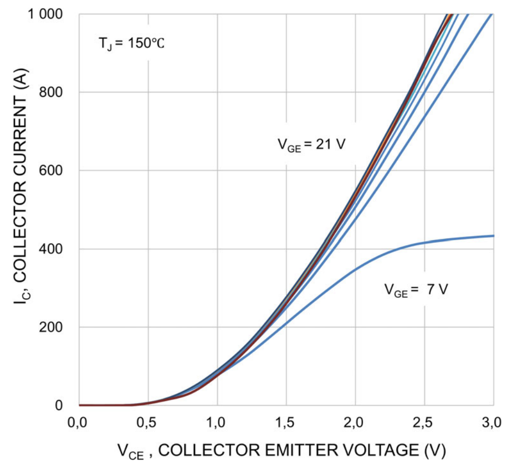


Figure 3. Typical Output Characteristics – IGBT

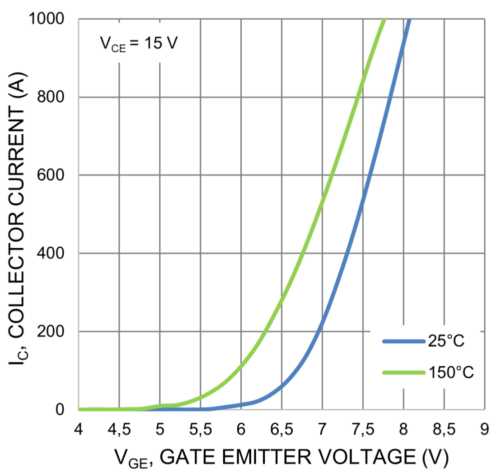


Figure 4. Transfer Characteristics – IGBT

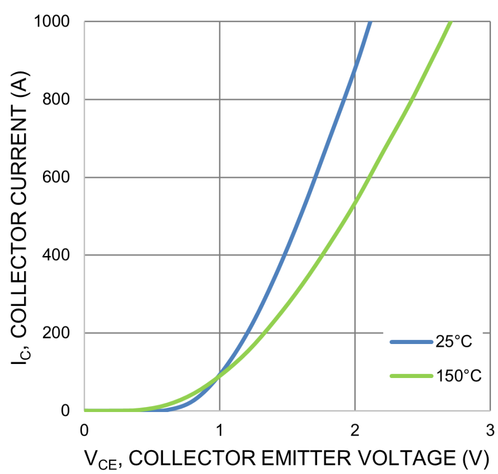


Figure 5. Saturation Voltage Characteristic – IGBT

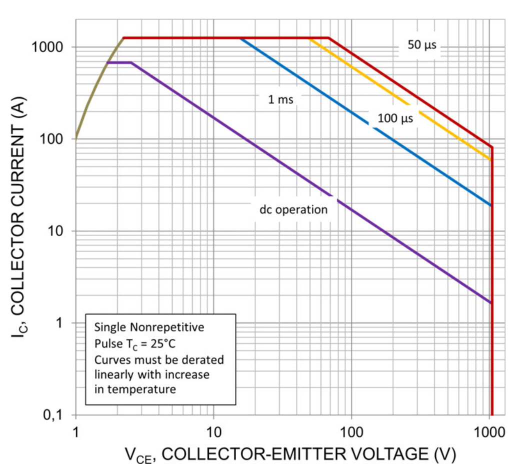


Figure 6. FBSOA

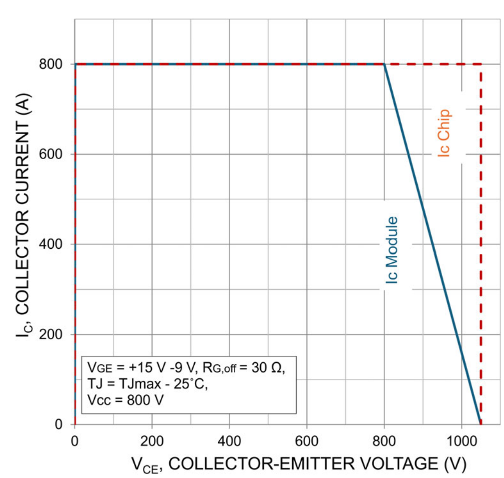


Figure 7. RBSOA

TYPICAL CHARACTERISTICS – IGBT T1/T4 AND D5/D6 DIODE (continued)

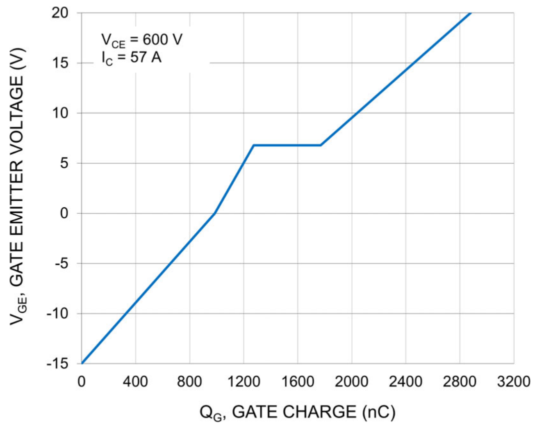


Figure 8. Gate Voltage vs. Gate Charge

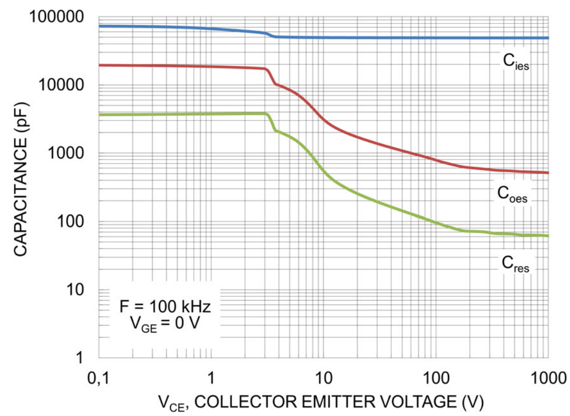


Figure 9. Capacitance

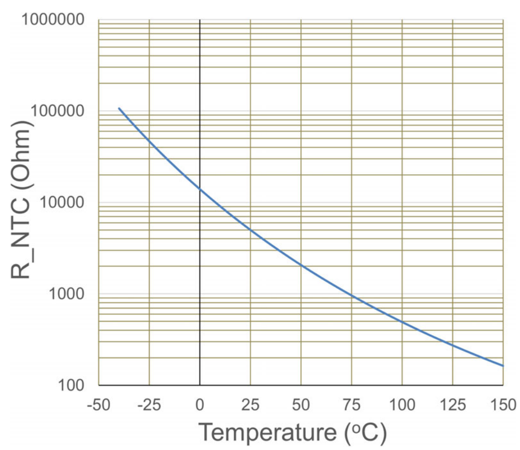


Figure 10. Temperature vs. NTC Value

TYPICAL CHARACTERISTICS – IGBT T2/T3 AND D3/D4, D1/D2 DIODE

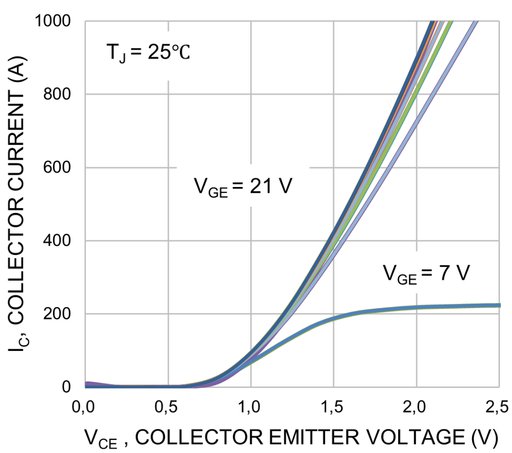


Figure 11. Typical Output Characteristics

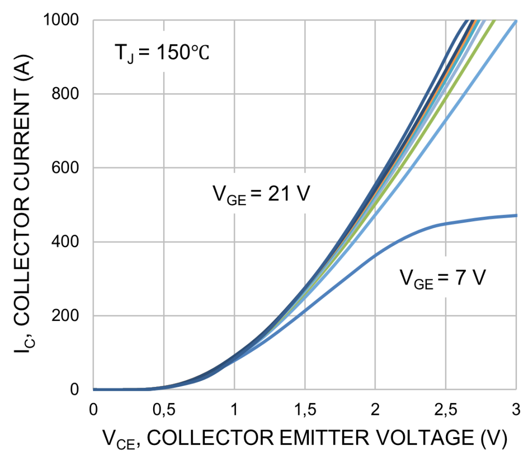


Figure 12. Typical Output Characteristics

TYPICAL CHARACTERISTICS – IGBT T2/T3 AND D3/D4, D1/D2 DIODE (continued)

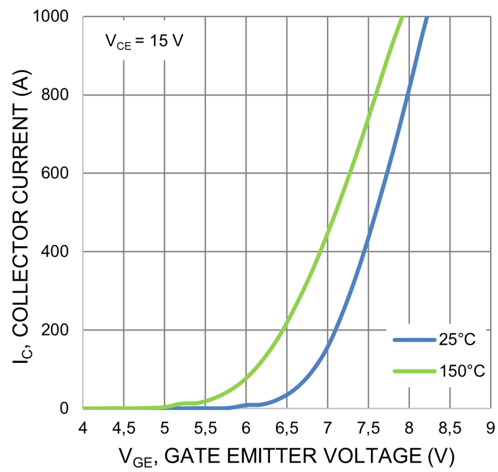


Figure 13. Transfer Characteristics – IGBT

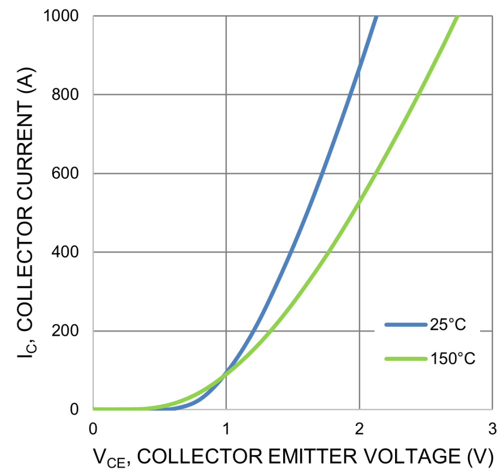


Figure 14. Saturation Voltage Characteristic – IGBT

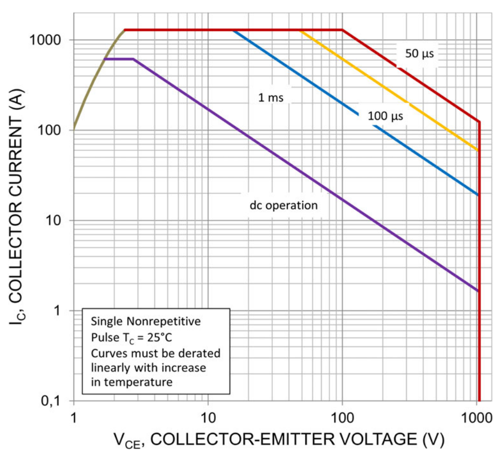


Figure 15. FBSOA

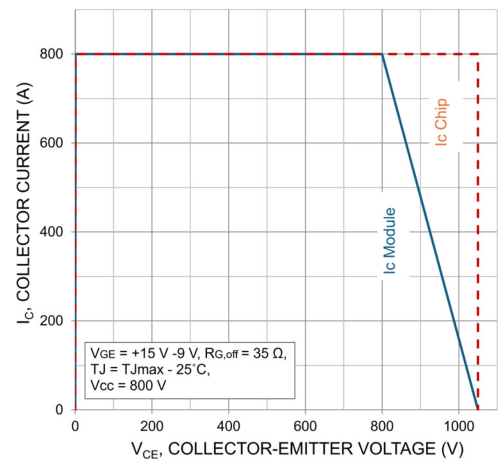


Figure 16. RBSOA

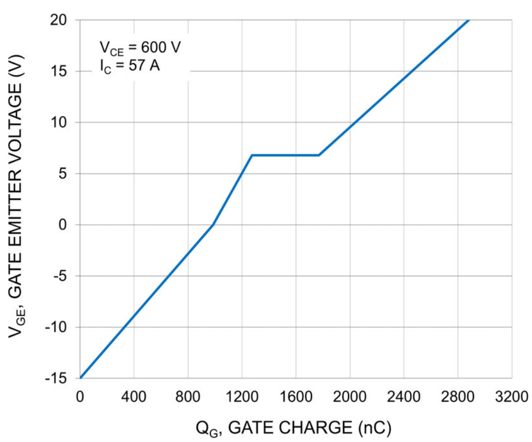


Figure 17. Gate Voltage vs. Gate Charge

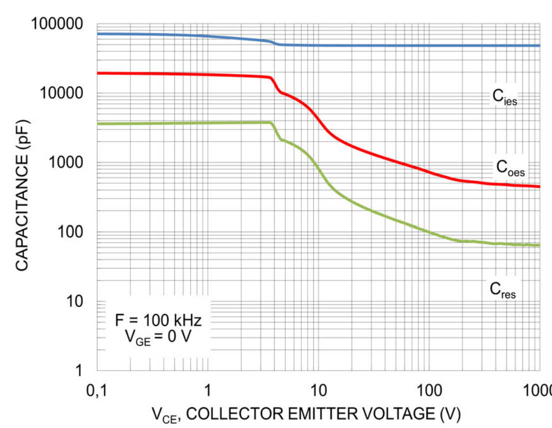


Figure 18. Capacitance vs. V_{CE}

TYPICAL CHARACTERISTICS – IGBT T2/T3 AND D3/D4, D1/D2 DIODE (continued)

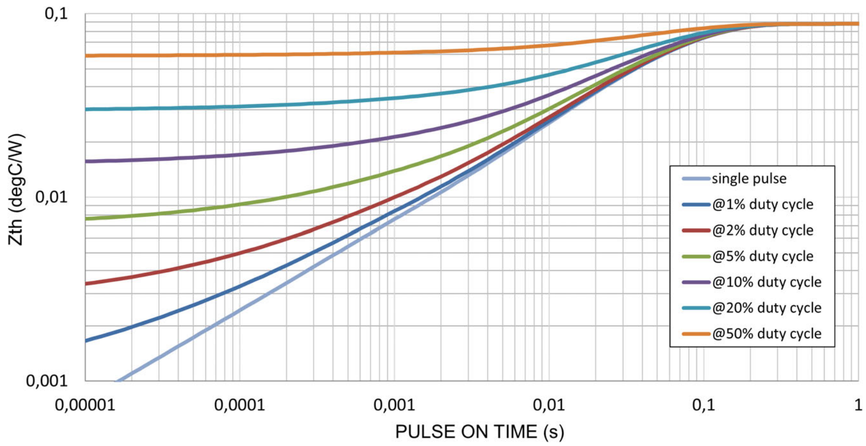


Figure 19. Transient Thermal Impedance (IGBT)

TYPICAL CHARACTERISTIC – D2, D3 (SiC INVERSE DIODE)

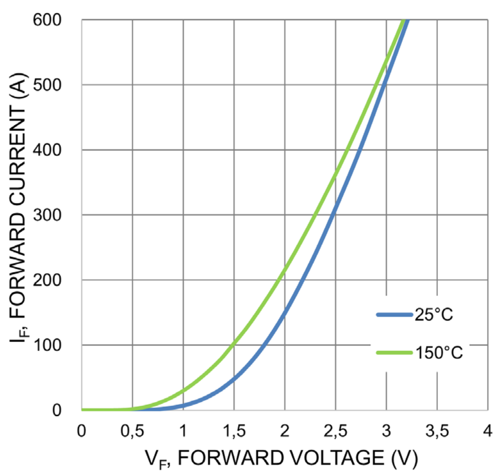


Figure 20. Inverse Diode Forward Characteristics

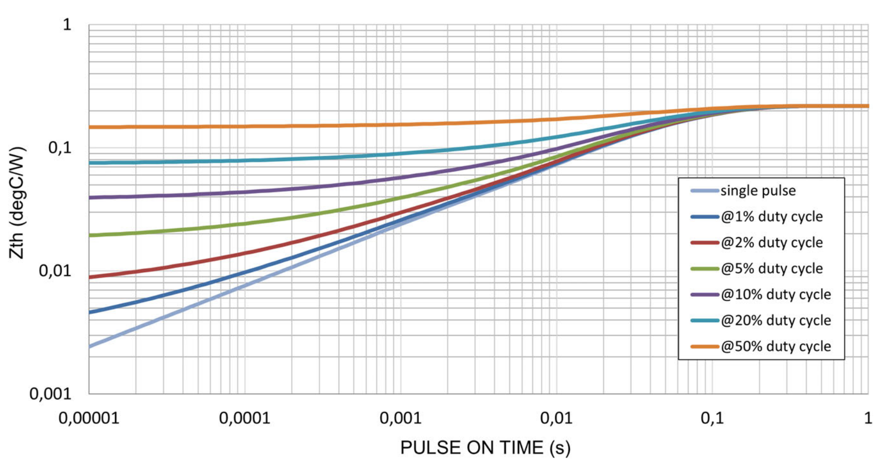


Figure 21. Transient Thermal Impedance (Inverse Diode)

TYPICAL CHARACTERISTIC – D5/D6 (NEUTRAL POINT DIODE)

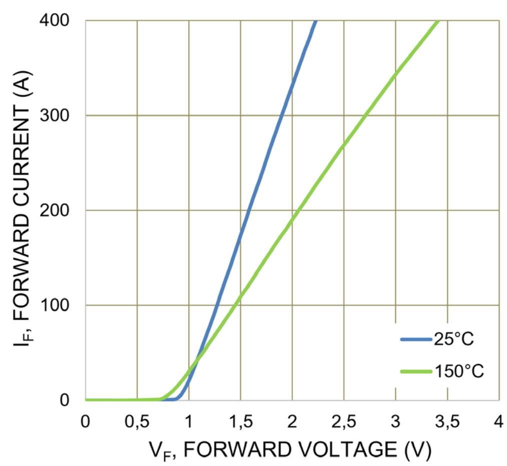


Figure 22. Neutral Diode Forward Characteristics

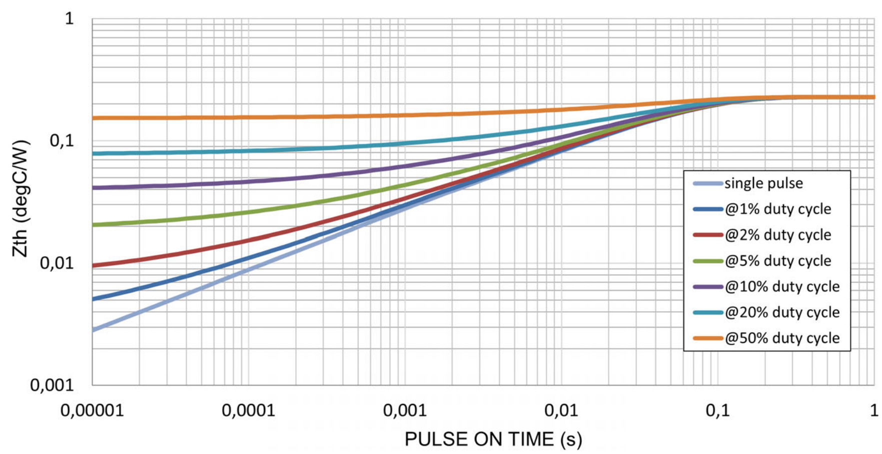


Figure 23. Transient Thermal Impedance (Neutral Point Diode)

TYPICAL CHARACTERISTIC – T1||D5 OR T4||D6

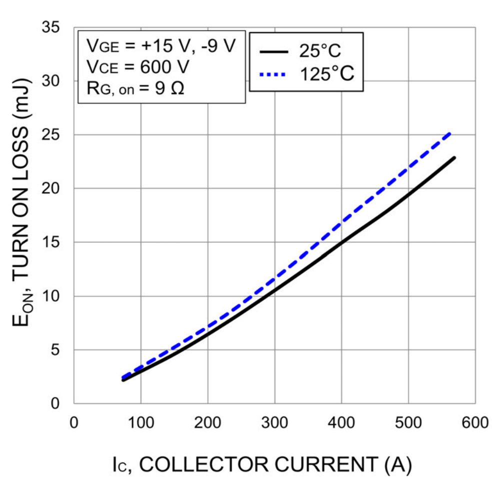


Figure 24. Typical Turn On Loss vs. I_C

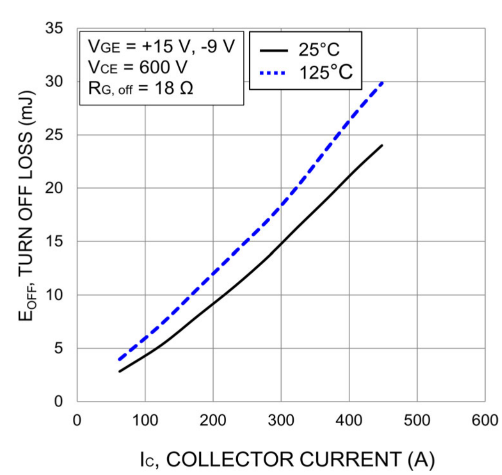


Figure 25. Typical Turn Off Loss vs. I_C

TYPICAL CHARACTERISTIC – T1||D5 OR T4||D6 (continued)

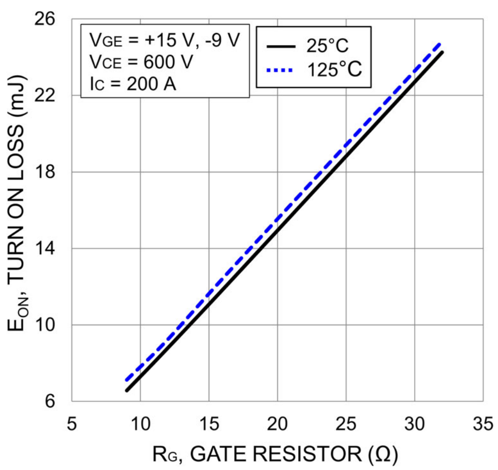


Figure 26. Typical Turn On Loss vs. R_G

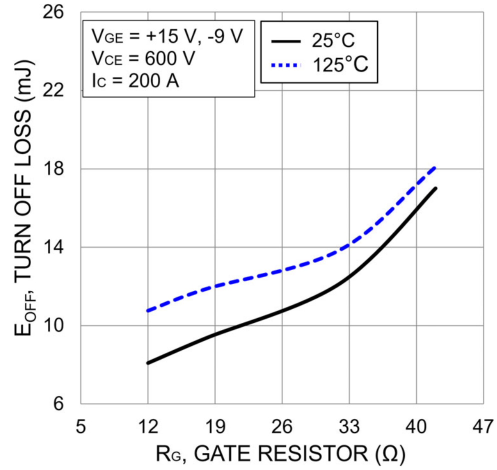


Figure 27. Typical Turn Off Loss vs. R_G

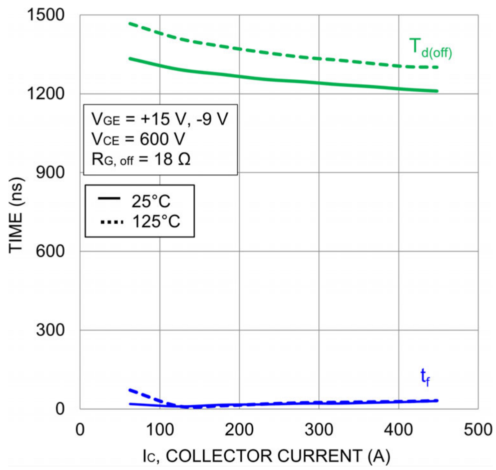


Figure 28. Typical Turn-Off Switching Time vs. I_C

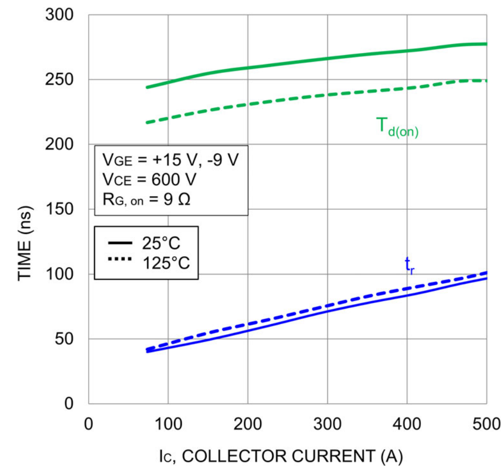


Figure 29. Typical Turn-On Switching Time vs. I_C

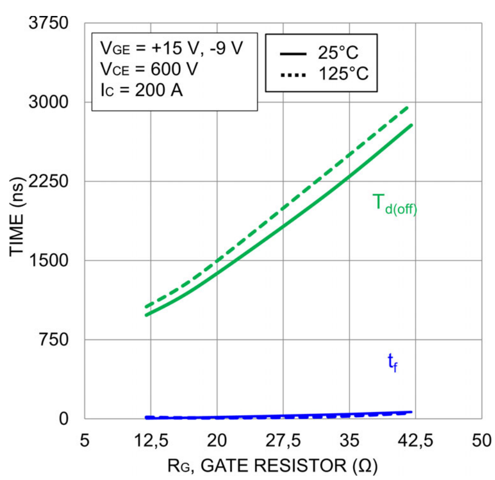


Figure 30. Typical Turn-Off Switching Time vs. R_G

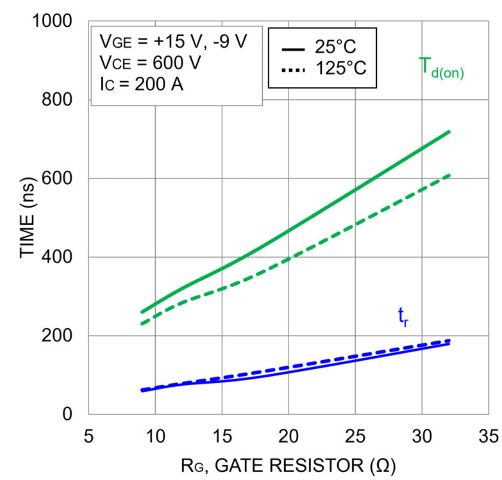


Figure 31. Typical Turn-On Switching Time vs. R_G

TYPICAL CHARACTERISTIC – D5/D6 (NEUTRAL POINT DIODE)

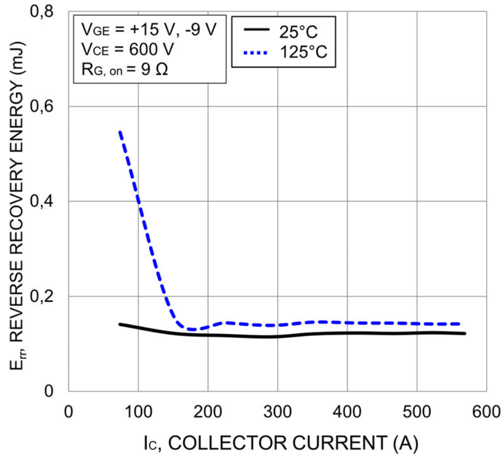


Figure 32. Typical Reverse Recovery Energy Loss vs. I_C

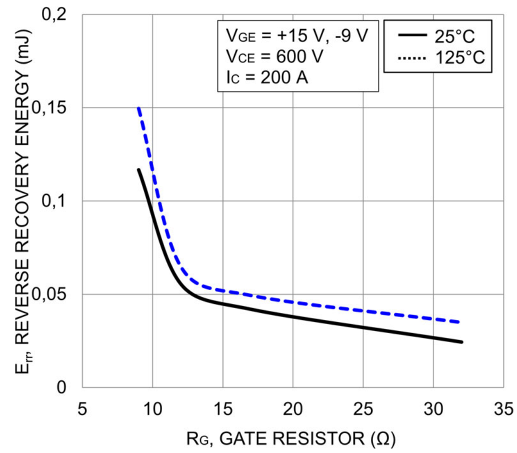


Figure 33. Typical Reverse Recovery Energy Loss vs. R_G

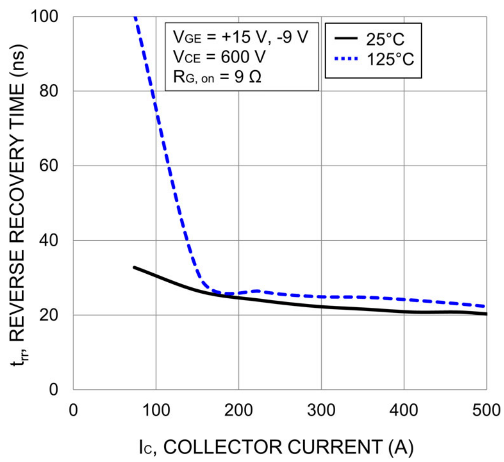


Figure 34. Typical Reverse Recovery Time vs. I_C

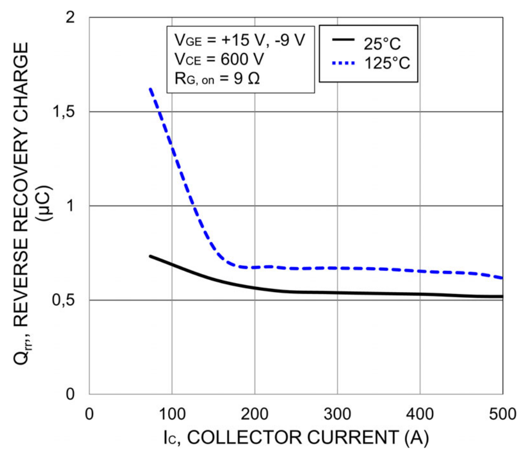


Figure 35. Typical Reverse Recovery Charge vs. I_C

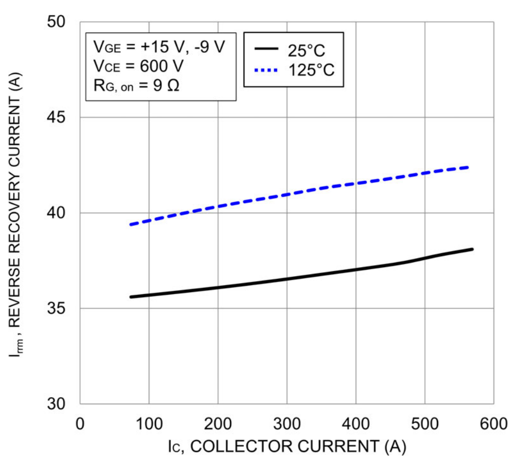


Figure 36. Typical Reverse Recovery Current vs. I_C

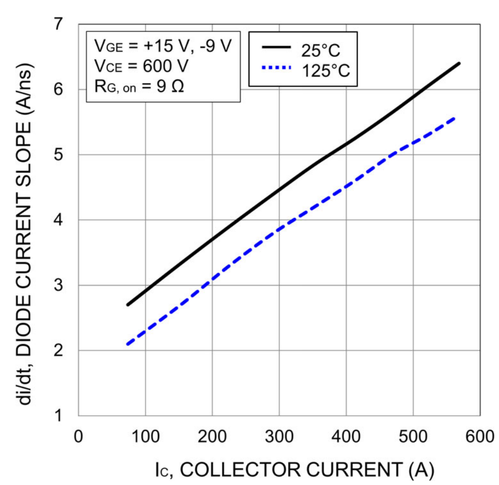


Figure 37. Typical Diode Current Slope vs. I_C

TYPICAL CHARACTERISTIC – D5/D6 (NEUTRAL POINT DIODE) (continued)

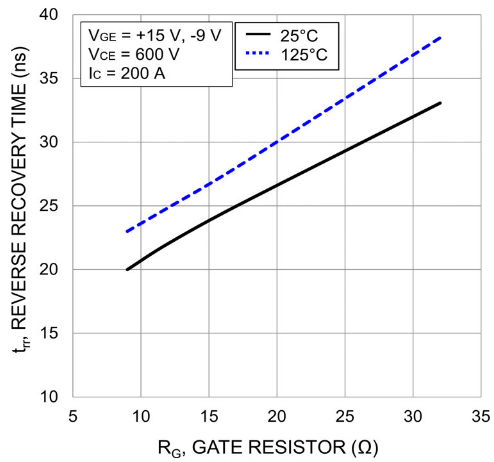


Figure 38. Typical Reverse Recovery Time vs. R_G

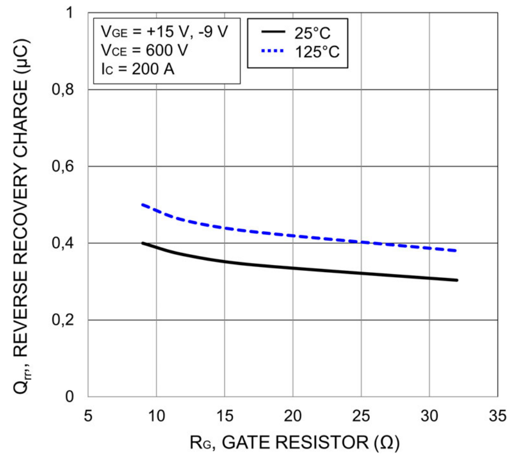


Figure 39. Typical Reverse Recovery Charge vs. R_G

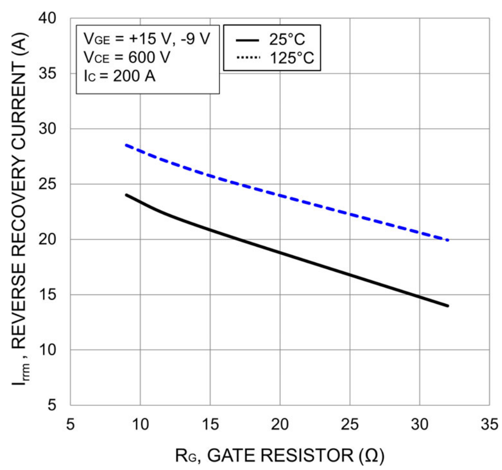


Figure 40. Typical Reverse Recovery Current vs. R_G

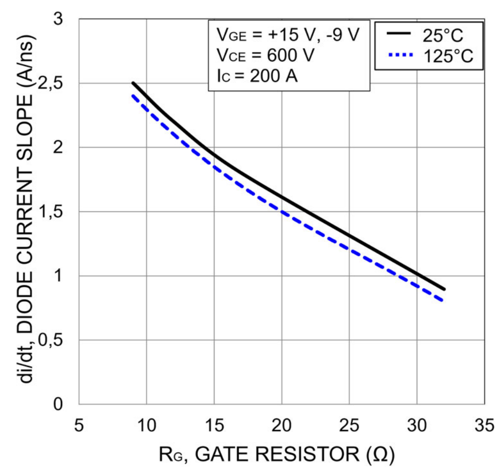


Figure 41. Typical Diode Current Slope vs. R_G

TYPICAL CHARACTERISTIC – T2||D3 + D4 OR T3||D1 + D2

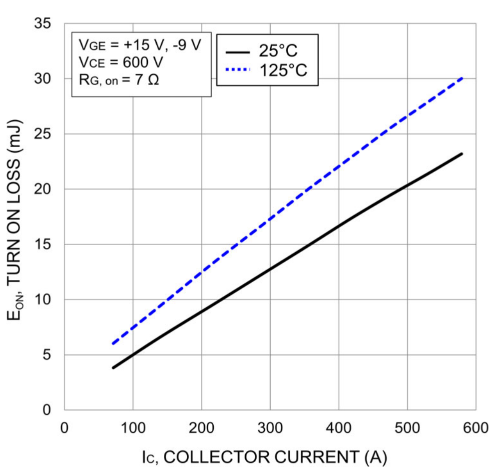


Figure 42. Typical Turn On Loss vs. I_C

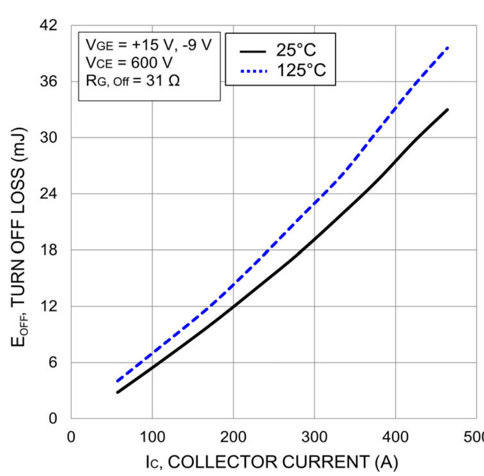


Figure 43. Typical Turn Off Loss vs. I_C

TYPICAL CHARACTERISTIC – T2||D3 + D4 OR T3||D1 + D2 (continued)

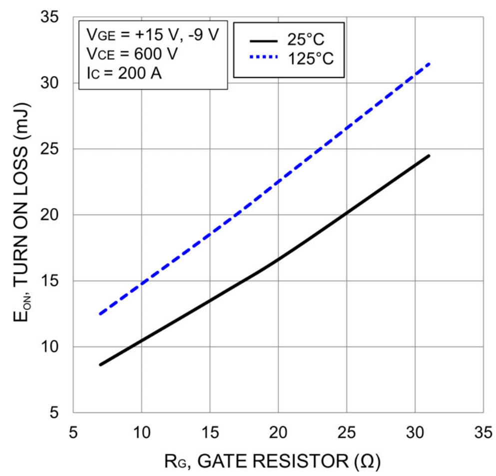


Figure 44. Typical Turn On Loss vs. R_G

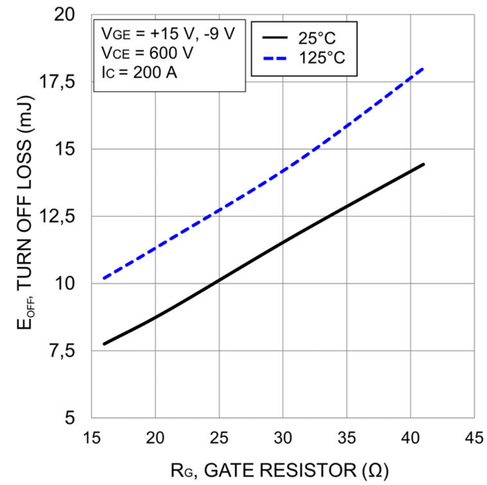


Figure 45. Typical Turn Off Loss vs. R_G

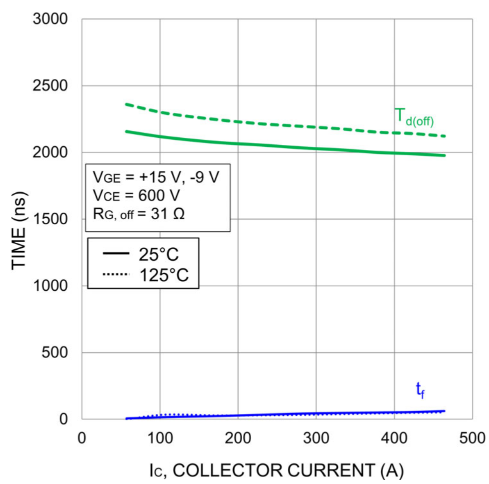


Figure 46. Typical Turn-Off Switching Time vs. I_C

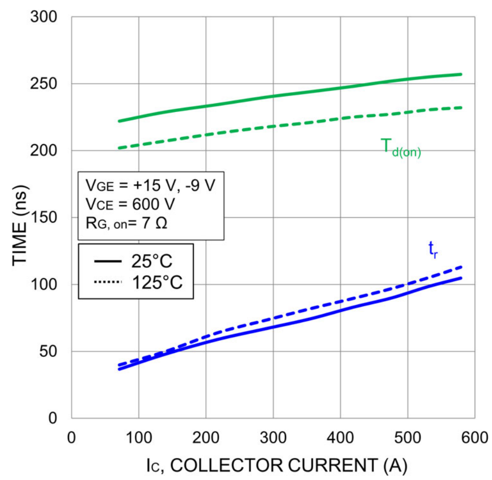


Figure 47. Typical Turn-On Switching Time vs. I_C

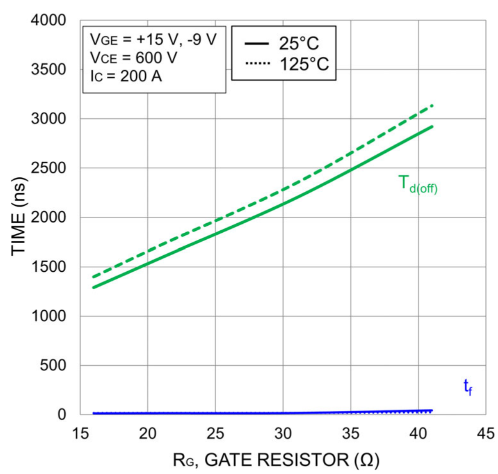


Figure 48. Typical Turn-Off Switching Time vs. R_G

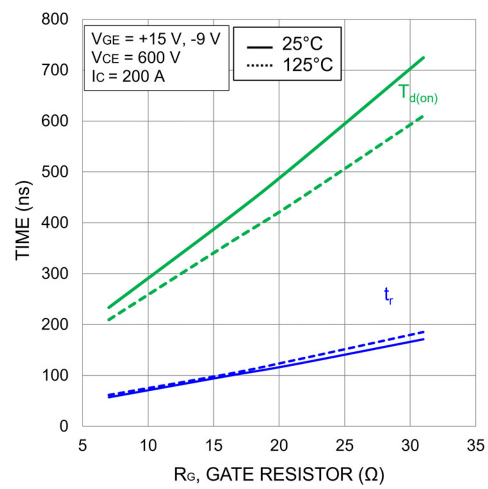


Figure 49. Typical Turn-On Switching Time vs. R_G

TYPICAL CHARACTERISTIC – T2||D3 + D4 OR T3||D1 + D2 (continued)

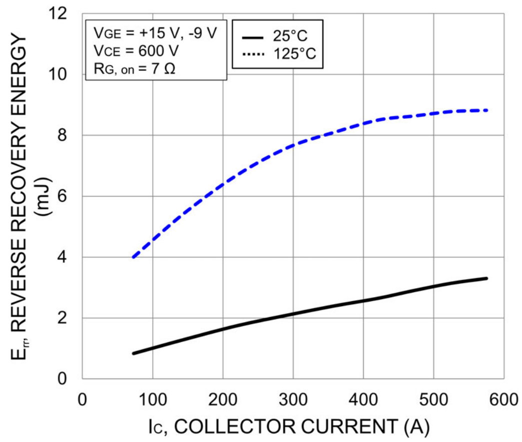


Figure 50. Typical Reverse Recovery Energy Loss vs. I_C

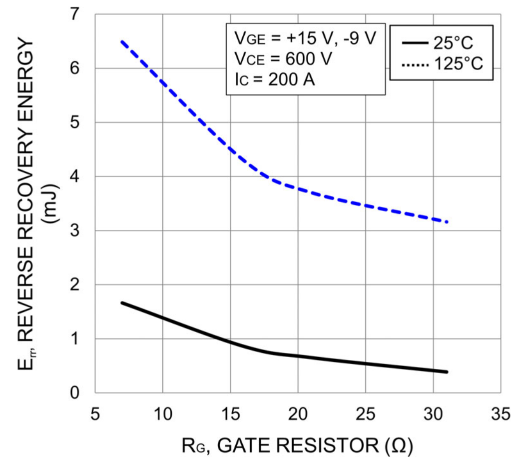


Figure 51. Typical Reverse Recovery Energy Loss vs. R_G

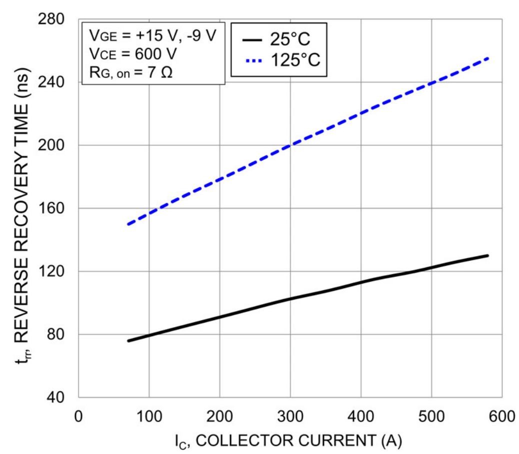


Figure 52. Typical Reverse Recovery Time vs. I_C

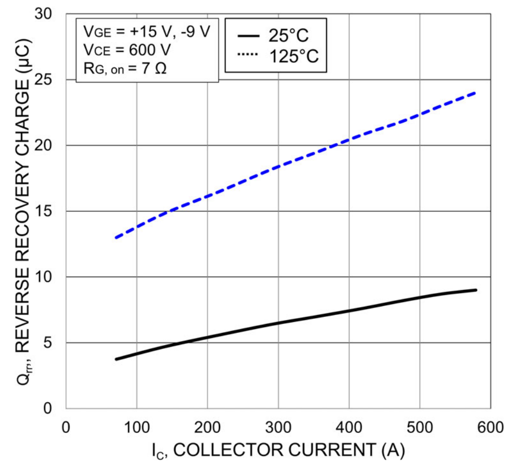


Figure 53. Typical Reverse Recovery Charge vs. I_C

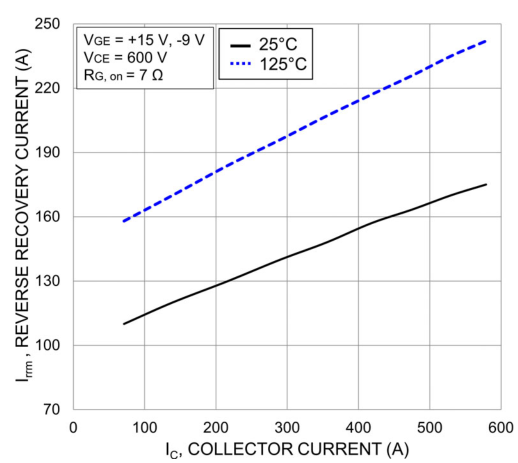


Figure 54. Typical Reverse Recovery Current vs. I_C

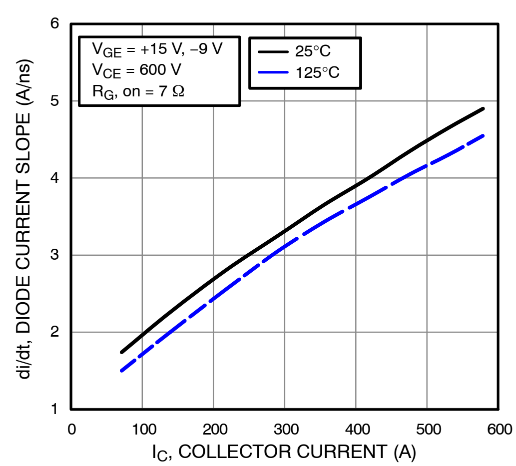


Figure 55. Typical di/dt vs. I_C

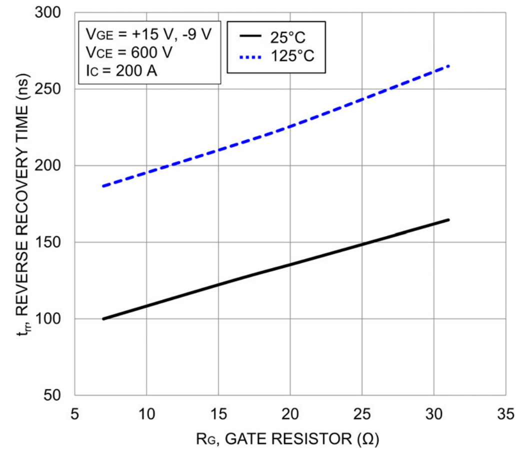


Figure 56. Typical Reverse Recovery Time vs. R_G

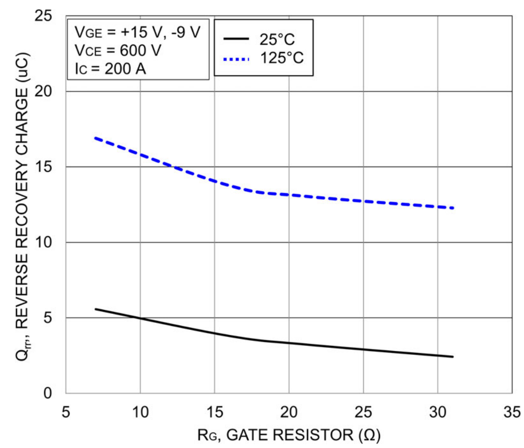


Figure 57. Typical Reverse Recovery Charge vs. R_G

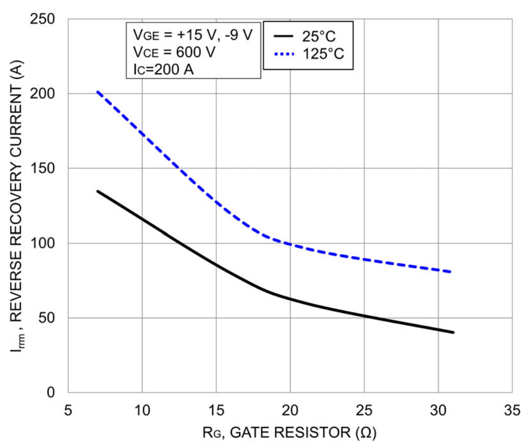


Figure 58. Typical Reverse Recovery Peak Current vs. R_G

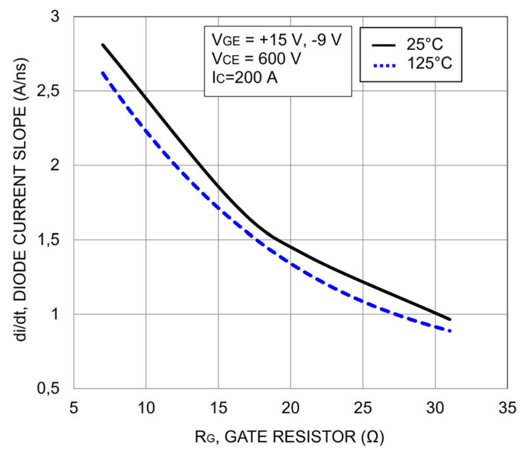
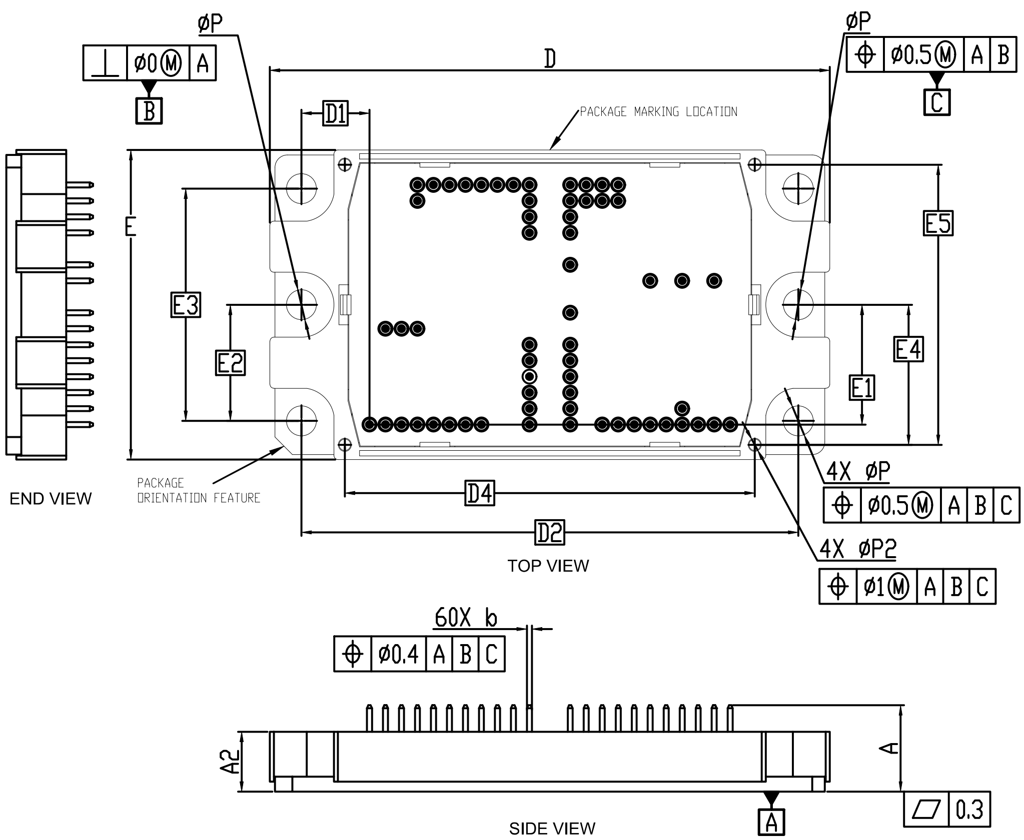


Figure 59. Typical di/dt vs. R_G

PACKAGE DIMENSIONS

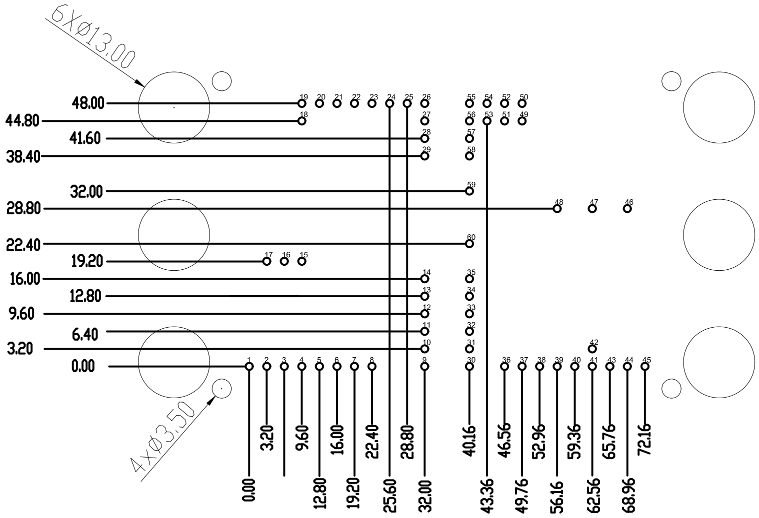
PIM60 112.00x62.00x12.00
CASE 180CW
ISSUE O

NOTES:
1. Dimensioning and tolerancing conform to ASME Y14.5
2. All dimensions are in millimeters.
3. Pin-grid is 3.2mm.
4. Package marking is located on the side opposite the package orientation feature.
5. The pins are gold-plated solder pin.



DIM	MILLIMETERS MIN.	NOM.	MAX.
A	17.00	17.40	17.80
A2	11.70	12.00	12.30
b	0.95	1.00	1.05
D	111.60	112.00	112.40
D1		13.62 BSC	
D2		99.40 BSC	
D4		82.00 BSC	
E	61.60	62.00	62.40
E1		24.00 BSC	
E2		23.25 BSC	
E3		46.50 BSC	
E4		28.05 BSC	
E5		56.10 BSC	
P	5.90	6.00	6.10
P2	2.20	2.30	2.40

PIM60 112.00x62.00x12.00
CASE 180CW
ISSUE O



RECOMMENDED
MOUNTING PATTERN

* For additional Information on our Pb−Free strategy and soldering details, please download the Onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

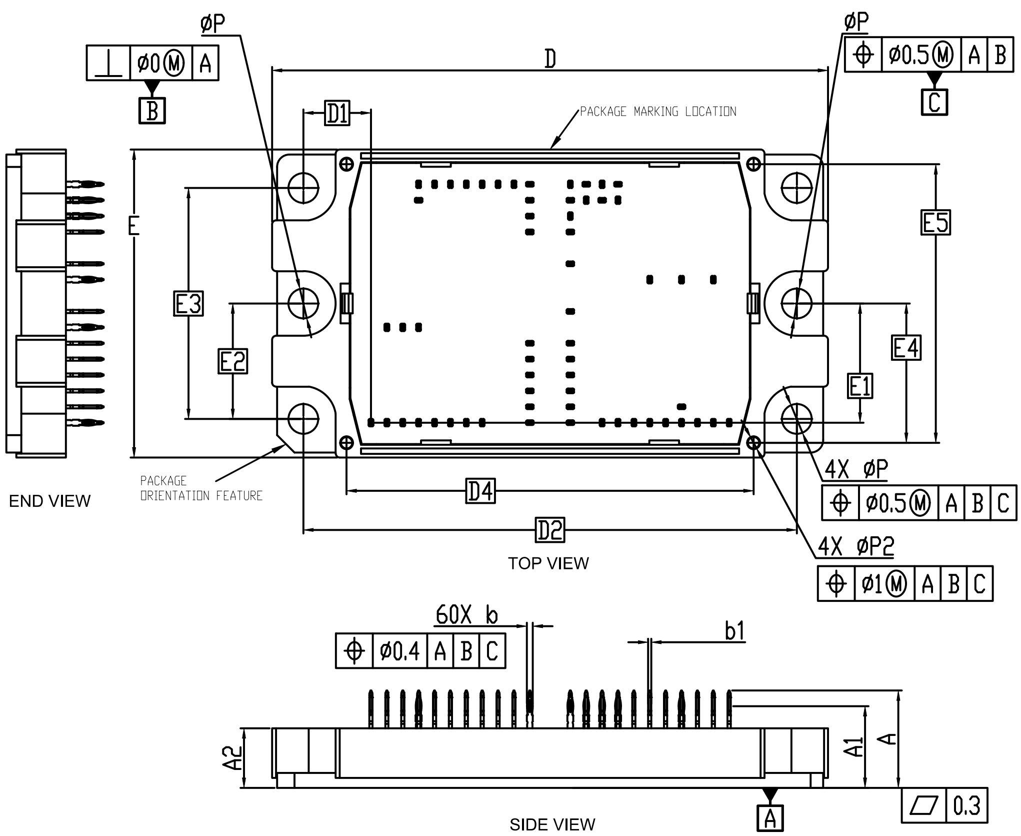
NOTE 2:

Pin POSITION								
Pin	X	Y	Pin	X	Y	Pin	X	Y
1	0.00	0.00	24	25.60	48.00	47	62.56	28.80
2	3.20	0.00	25	28.80	48.00	48	56.16	28.80
3	6.40	0.00	26	32.00	48.00	49	49.76	44.80
4	9.60	0.00	27	32.00	44.80	50	49.76	48.00
5	12.80	0.00	28	32.00	41.60	51	46.56	44.80
6	16.00	0.00	29	32.00	38.40	52	46.56	48.00
7	19.20	0.00	30	40.16	0.00	53	43.36	44.80
8	22.40	0.00	31	40.16	3.20	54	43.36	48.00
9	32.00	0.00	32	40.16	6.40	55	40.16	48.00
10	32.00	3.20	33	40.16	9.60	56	40.16	44.80
11	32.00	6.40	34	40.16	12.80	57	40.16	41.60
12	32.00	9.60	35	40.16	16.00	58	40.16	38.40
13	32.00	12.80	36	46.56	0.00	59	40.16	32.00
14	32.00	16.00	37	49.76	0.00	60	40.16	22.40
15	9.60	19.20	38	52.96	0.00			
16	6.40	19.20	39	56.16	0.00			
17	3.20	19.20	40	59.36	0.00			
18	9.60	44.80	41	62.56	0.00			
19	9.60	48.00	42	62.56	3.20			
20	12.80	48.00	43	65.76	0.00			
21	16.00	48.00	44	68.96	0.00			
22	19.20	48.00	45	72.16	0.00			
23	22.40	48.00	46	68.96	28.80			

PACKAGE DIMENSIONS

PIM60 112.00x62.00x12.00
CASE 180HY
ISSUE O

NOTES:
1. Dimensioning and tolerancing conform to ASME Y14.5
2. All dimensions are in millimeters.
3. Dimensions b and b1 apply to the plated terminals and are measured at dimension A1
4. Pin-grid is 3.2mm.
5. Package marking is located on the side opposite the package orientation feature.
6. The pins are Sn plated press fit pin.



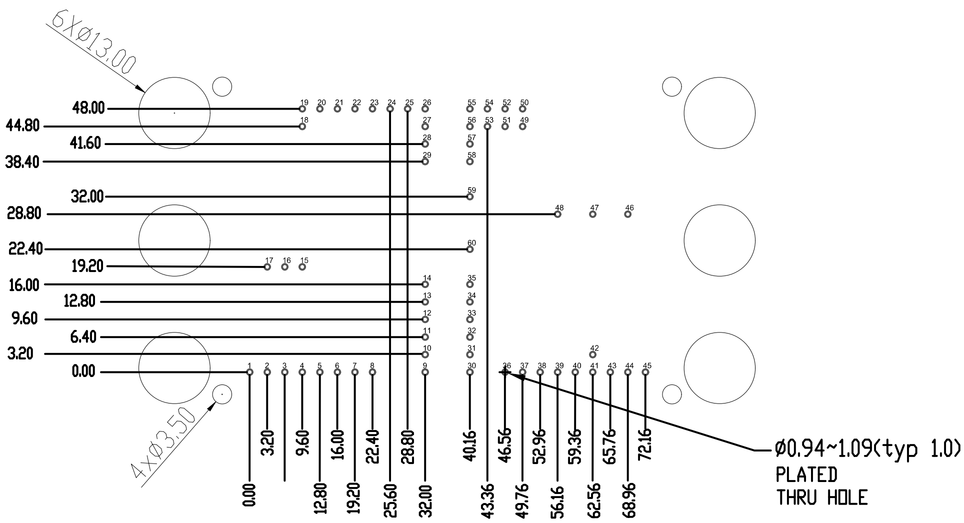
END VIEW

TOP VIEW

SIDE VIEW

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	19.20	19.60	20.00
A1	16.25	16.45	16.65
A2	11.70	12.00	12.30
b	1.15	1.20	1.25
b1	0.59	0.64	0.69
D	111.60	112.00	112.40
D1	13.62 BSC		
D2	99.40 BSC		
D4	82.00 BSC		
E	61.60	62.00	62.40
E1	24.00 BSC		
E2	23.25 BSC		
E3	46.50 BSC		
E4	28.05 BSC		
E5	56.10 BSC		
P	5.90	6.00	6.10
P2	2.20	2.30	2.40

PIM60 112.00x62.00x12.00
CASE 180HY
ISSUE O



RECOMMENDED
MOUNTING PATTERN

* For additional Information on our Pb−Free strategy and soldering details, please download the Onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTE 2:

Pin POSITION								
Pin	X	Y	Pin	X	Y	Pin	X	Y
1	0.00	0.00	24	25.60	48.00	47	62.56	28.80
2	3.20	0.00	25	28.80	48.00	48	56.16	28.80
3	6.40	0.00	26	32.00	48.00	49	49.76	44.80
4	9.60	0.00	27	32.00	44.80	50	49.76	48.00
5	12.80	0.00	28	32.00	41.60	51	46.56	44.80
6	16.00	0.00	29	32.00	38.40	52	46.56	48.00
7	19.20	0.00	30	40.16	0.00	53	43.36	44.80
8	22.40	0.00	31	40.16	3.20	54	43.36	48.00
9	32.00	0.00	32	40.16	6.40	55	40.16	48.00
10	32.00	3.20	33	40.16	9.60	56	40.16	44.80
11	32.00	6.40	34	40.16	12.80	57	40.16	41.60
12	32.00	9.60	35	40.16	16.00	58	40.16	38.40
13	32.00	12.80	36	46.56	0.00	59	40.16	32.00
14	32.00	16.00	37	49.76	0.00	60	40.16	22.40
15	9.60	19.20	38	52.96	0.00			
16	6.40	19.20	39	56.16	0.00			
17	3.20	19.20	40	59.36	0.00			
18	9.60	44.80	41	62.56	0.00			
19	9.60	48.00	42	62.56	3.20			
20	12.80	48.00	43	65.76	0.00			
21	16.00	48.00	44	68.96	0.00			
22	19.20	48.00	45	72.16	0.00			
23	22.40	48.00	46	68.96	28.80			

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